Enhancement of Oil In Place Through Reservoir Modeling of a Multilayered Siliciclastic Reservoir: A Case Study from Muglad Basin, Sudan

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El Toor field is located in block 1A of Greater Nile petroleum operating company concession area, Sudan. It was discovered in 1996. Production started early in year 2000. Cumulative production as of 2004 was 34 MMSTB, both PCP and ESP are used.

El toor is a fault-bounded anticline structure. The main reservoir is Bentiu sand of Early Cretaceous. Aradeiba E\F sands (late Cretaceous) are secondary oil accumulations. Both are layered sand reservoirs with continuous barriers between these layers over a big area in the field. After one year of sustained production, wells started to produce water. A team from Sudanese petroleum corporation (Sudapet) has conducted a study to remodel the field.

Geoframe and petrel softwares were used to develop the fault/structure and 3D geological model of the field. Geofeature mapping variance cube Ant-track techniques were used in addition to seismic attribute analysis to develop fault and structural models.

The facies model was built from the 3D seismic cube using seismic attributes. Facies and property model was built for all the cells of the 3D geological model. After remodeling and identification of sand bodies architecture and extent the oil in place was recalculated for the finely gridded 3D geological model and the model was up-scaled to 42 vertical layers. Dimensions of the up-scaled model were 114/30/42 in the I, J, and K directions.

Oil in place was calculated for 1P, 2P, and 3P cases as 232.226, 251.176 and 260.785 respectively. This study showed 48.7% increase in 2P case due to techniques applied and cut off's used